

**WHAT IS CLAIMED IS:**

1. A method for detecting an avian *E. coli* iss nucleic acid sequence encoding an Iss polypeptide, the method comprising:
  - (a) contacting a sample containing nucleic acids with first and second oligonucleotides under conditions effective to amplify at least one nucleic acid to yield an amplified nucleic acid molecule, wherein the first and second oligonucleotides are selected such that the amplified nucleic acid molecule comprises at least a portion of a nucleic acid sequence encoding an avian *E. coli* Iss polypeptide; and
  - (b) detecting the presence or absence of an amplified nucleic acid molecule, wherein the presence of an amplified nucleic acid molecule indicates the presence in the sample of an avian *E. coli* iss nucleic acid sequence encoding an Iss polypeptide.
2. The method of claim 1 wherein the sample is an environmental sample.
3. The method of claim 2 wherein the environmental sample is obtained from the group consisting of litter, feed, and water.
4. The method of claim 1 wherein the sample is a biological sample.
5. The method of claim 4 wherein the biological sample is from subject selected from the group consisting of a bird, a cow and a mink.
6. The method of claim 1 wherein the amplified nucleic acid molecule comprises a nucleic acid sequence encoding an avian *E. coli* Iss polypeptide.

7. The method of claim 6 wherein the nucleic acid sequence encoding the avian *E. coli* Iss polypeptide comprises SEQ ID NO:22.
8. The method of claim 1 wherein the first oligonucleotide hybridizes to a nucleic acid sequence, at least a portion of which is present 5' of the nucleic acid sequence encoding an avian *E. coli* Iss polypeptide.
9. The method of claim 8 wherein the nucleic acid sequence to which the first oligonucleotide hybridizes comprises at least 13 nucleotides of nucleotides 1 to 291 of SEQ ID NO:1.
10. The method of claim 1 wherein the second oligonucleotide hybridizes to a nucleic acid sequence, at least a portion of which is present 3' of the nucleic acid sequence encoding an avian *E. coli* Iss polypeptide.
11. The method of claim 10 wherein the nucleic acid sequence to which the first oligonucleotide hybridizes comprises at least 13 nucleotides of nucleotides 601-760 of SEQ ID NO:1.
12. The method of claim 1 wherein the first oligonucleotide hybridizes to at least a portion of a nucleic acid sequence that encodes an avian *E. coli* Iss polypeptide.
13. The method of claim 1 wherein the first oligonucleotide hybridizes to at least 13 nucleotides of SEQ ID NO:22.
14. The method of claim 1 wherein the second oligonucleotide hybridizes to at least a portion of a nucleic acid sequence that encodes an avian *E. coli* Iss polypeptide.

15. The method of claim 14 wherein the second oligonucleotide hybridizes to at least 13 nucleotides of SEQ ID NO:22.

16. A method for determining whether a subject is infected with an avian pathogenic *E. coli*, the method comprising:

(a) contacting a biological sample containing nucleic acids obtained from the subject with first and a second oligonucleotides under conditions effective to amplify at least one nucleic acid to yield an amplified nucleic acid molecule, wherein the first and second oligonucleotides are selected such that the amplified nucleic acid molecule comprises at least a portion of a nucleic acid sequence encoding an avian *E. coli* lss polypeptide; and

(b) detecting the presence or absence of an amplified nucleic acid molecule, wherein the presence of an amplified nucleic acid molecule indicates the subject is infected with an avian pathogenic *E. coli*.

17. The method of claim 16 wherein the sample is from a subject at risk of, or afflicted with, an *E. coli* infection.

18. The method of claim 17 wherein the subject is selected from the group consisting of a bird, a cow and a mink.

19. The method of claim 16 wherein the amplified nucleic acid molecule comprises a nucleic acid sequence encoding an avian *E. coli* lss polypeptide.

20. The method of claim 19 wherein the nucleic acid sequence encoding the avian *E. coli* lss polypeptide comprises SEQ ID NO:22.

21. The method of claim 16 wherein the first oligonucleotide hybridizes to a nucleic acid sequence, at least a portion of which is present 5' of the nucleic acid sequence encoding an avian *E. coli* Iss polypeptide.
22. The method of claim 21 wherein the nucleic acid sequence to which the first oligonucleotide hybridizes comprises at least 13 nucleotides of nucleotides 1 to 291 of SEQ ID NO:1.
23. The method of claim 16 wherein the second oligonucleotide hybridizes to a nucleic acid sequence, at least a portion of which is present 3' of the nucleic acid sequence encoding an avian *E. coli* Iss polypeptide.
24. The method of claim 23 wherein the nucleic acid sequence to which the second oligonucleotide hybridizes comprises at least 13 nucleotides of nucleotides 601-760 of SEQ ID NO:1.
25. The method of claim 16 wherein the first oligonucleotide hybridizes to at least a portion of a nucleic acid sequence that encodes an avian *E. coli* Iss polypeptide.
26. The method of claim 25 wherein the first oligonucleotide hybridizes to at least 13 nucleotides of SEQ ID NO:22.
27. The method of claim 16 wherein the second oligonucleotide hybridizes to at least a portion of a nucleic acid sequence that encodes an avian *E. coli* Iss polypeptide.
28. The method of claim 27 wherein the second oligonucleotide hybridizes to at least 13 nucleotides of SEQ ID NO:22.

29. The method of claim 16 wherein the avian *E. coli* ss nucleic acid sequence to which at least one oligonucleotide hybridizes comprises at least 13 nucleotides of SEQ ID NO:22.

30. An isolated nucleic acid molecule comprising nucleotides 73 to 309 of SEQ ID NO:22.

31. The isolated nucleic acid molecule of claim 30 further comprising nucleotides 1 to 33 of SEQ ID NO:21, wherein the 33 nucleotides of SEQ ID NO:21 are located 5' of nucleotides 73 to 309 of SEQ ID NO:22.

32. The isolated nucleic acid molecule of claim 30 wherein the nucleic acid sequence is operably linked to a promoter functional in a host cell so as to form an expression vector.

33. An expression vector comprising an isolated nucleic acid molecule comprising nucleotides 73 to 309 of SEQ ID NO:22, operably linked to a least one regulatory sequence or control sequence.

34. An isolated nucleic acid molecule comprising at least 13 nucleotides, wherein a region comprising at least 13 nucleotides of the isolated nucleic acid molecule hybridizes to nucleotides 73 to 309 of SEQ ID NO:22 under stringent conditions.

35. A method of using a nucleic acid molecule encoding an *E. coli* ss polypeptide, the method comprising:

providing a host cell stably transformed with an expression vector comprising a nucleic acid molecule comprising nucleotides 73 to 309 of SEQ ID NO:22, operably linked to a least one regulatory sequence or control sequence

recognized by the host cell; and

expressing the nucleic acid molecule to yield an *E. coli* Iss polypeptide.

36. The method of claim 35 wherein the nucleic acid molecule further comprises nucleotides 1 to 33 of SEQ ID NO:21 located 5' of nucleotides 73 to 309 of SEQ ID NO:22.

37. An immunogenic composition comprising a nucleic acid molecule comprising a nucleotide sequence encoding a polypeptide comprising an avian *E. coli* Iss polypeptide or an immunogenic fragment or subunit thereof.

38. The immunogenic composition of claim 37 wherein the nucleic acid molecule comprises a vector.

39. The immunogenic composition of claim 38 wherein the vector is a plasmid.

40. The immunogenic composition of claim 38 wherein the vector is a viral vector.

41. The immunogenic composition of claim 37 wherein the nucleic acid molecule further comprises at least one regulatory sequence or control sequence operably linked to the nucleotide sequence encoding the polypeptide.

42. The immunogenic composition of claim 38 wherein the nucleic acid molecule further comprises an immunostimulatory sequence.

43. The immunogenic composition of claim 38 wherein the nucleic acid molecule comprises nucleotides 73 to 309 of SEQ ID NO:22 or a subunit or fragment thereof.

44. The immunogenic composition of claim 38 wherein the nucleic acid molecule comprises nucleotides 73 to 309 of SEQ ID NO:22.

45. The immunogenic composition of claim 43 wherein the nucleic acid molecule further comprising nucleotides 1 to 33 of SEQ ID NO:21 located 5' of nucleotides 73 to 309 of SEQ ID NO:22.

46. A method for using an immunogenic composition comprising:  
providing an immunogenic composition comprising a nucleic acid molecule comprising a nucleotide sequence encoding a polypeptide comprising an avian *E. coli* lss polypeptide or an immunogenic fragment or subunit thereof; and  
administering the immunogenic composition to a subject diagnosed with, at risk of, or exhibiting symptoms of an *E. coli* infection.

47. The method of claim 46 wherein the *E. coli* infection is selected from the group consisting of septicemic disease, colibacillosis, coligranuloma, peritonitis, salpingitis, synovitis, and omphalitis.

48. The method of claim 46 wherein the nucleic acid molecule comprises a vector.

49. The method of claim 48 wherein the vector is a plasmid.

50. The method of claim 48 wherein the vector is a viral vector.

51. The method of claim 46 wherein the nucleic acid molecule further comprises at least one regulatory sequence or control sequence operably linked to the nucleotide sequence encoding the polypeptide.

52. The method of claim 46 wherein the nucleic acid molecule further comprises an immunostimulatory sequence.

53. The method of claim 46 wherein the nucleic acid molecule comprises nucleotides 73 to 309 of SEQ ID NO:22 or a subunit or fragment thereof.

54. The method of claim 53 wherein the nucleic acid molecule comprises nucleotides 73 to 309 of SEQ ID NO:22.

55. The method of claim 53, the nucleic acid molecule further comprising nucleotides 1 to 33 of SEQ ID NO:21 located 5' of nucleotides 73 to 309 of SEQ ID NO:22.

56. The method of claim 46 wherein the subject is selected from the group consisting of a bird, a cow and a mink.

57. A method for making an immunogenic composition, the method comprising combining a pharmaceutically acceptable carrier and a nucleic acid molecule comprising a nucleotide sequence encoding a polypeptide comprising an avian *E. coli* Iss polypeptide or an immunogenic fragment or subunit thereof.

58. A method for vaccinating a subject comprising administering to the subject a nucleic acid molecule comprising a nucleotide sequence encoding a polypeptide comprising an *E. coli* Iss polypeptide or an immunogenic fragment or subunit thereof in an amount effective to result in an immune response that is specific for the Iss polypeptide.

59. The method of claim 58 wherein the nucleic acid molecule comprises a vector.



60. The method of claim 58 wherein the nucleic acid molecule further comprises a regulatory sequence or a control sequence operably linked to the nucleotide sequence encoding the polypeptide.

61. The method of claim 58 wherein the nucleic acid molecule further comprises an immunostimulatory sequence.

62. The method of claim 58 wherein the subject is selected from the group consisting of a bird, a cow or a mink.

63. A method for treating or preventing disease in a subject caused by a complement resistant *E. coli* comprising administering to the subject a vaccine comprising a nucleic acid molecule comprising a nucleotide sequence encoding a polypeptide comprising an *E. coli* lss polypeptide or an immunogenic fragment or subunit thereof.

64. The method of claim 63 wherein the nucleic acid molecule comprises a vector.

65. The method of claim 63 wherein the nucleic acid molecule further comprises a regulatory sequence or a control sequence operably linked to the nucleotide sequence encoding the polypeptide.

66. The method of claim 65 wherein the nucleic acid molecule further comprises an immunostimulatory sequence.